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# *Sphagnum Moss*

FOR PLANT  
PROPAGATION



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All types of propagation in sphagnum moss, not merely propagation by seed, are dealt with in this bulletin. The original version of this bulletin, published as Leaflet 243, dealt only with sphagnum moss for seed germination. It was written by V. T. Stoutemeyer, Albert W. Close, and Claude Hope.

NEG. NO. 90089

Cover.—Assembling sphagnum-moss-grown coffee plants for air shipment.

Supersedes Leaflet 243, Sphagnum Moss for Seed Germination

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# Sphagnum Moss

## FOR PLANT PROPAGATION

By J. L. Creech, horticulturist, R. F. Dowdle, agricultural aid, and W. O. Hawley, assistant horticulturist, Horticultural Crops Research Branch, Agricultural Research Service

Sphagnum moss is an acid-bog plant that is used as a soil substitute in propagating, growing, and shipping plants. This medium has become important to commercial nurserymen, home gardeners, and others who handle plants, because of its sterile condition, high water-holding capacity, and lightness in weight. In several States, including Maine, New Jersey, Georgia, and Wisconsin, small industries are based on the harvesting, dehydrating, and baling of the crude sphagnum moss for horticultural uses. Figure 1 shows the baled

moss as it is sold by most horticultural supply houses. Before the moss is used it is generally shredded either by hand or by machine.

Bales of the crude moss are 16 by 14 by 48 inches and weigh about 20 to 22 pounds. Because of the wide natural distribution of sphagnum moss, small bogs may be found locally where the crude moss<sup>1</sup> can be gathered and used just as well as the processed or baled moss.

<sup>1</sup> *Sphagnum papillosum* and *S. palustre* are common native species.



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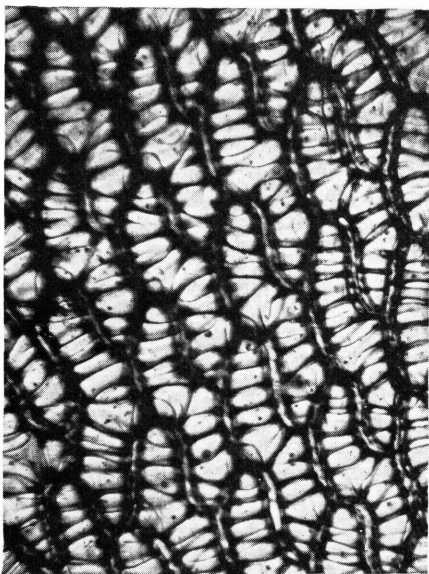
FIGURE 1.—Sphagnum moss as it is received from the dealer.



## PROPERTIES OF SPHAGNUM MOSS

Sphagnum moss is capable of absorbing 10 to 20 times its weight in water. This is because the leaves and stems are made up largely of groups of specially constructed water-holding cells, supported by thickenings of the walls and separated by narrow bands of tissue containing chlorophyll. Figure 2 shows a magnified sphagnum leaf. Since there is little deterioration of sphagnum moss that is taken fresh from the bog and baled, the water-holding capacity continues to exist after the moss has been dehydrated. Because of the cellular structure, added water is distributed evenly through the moss and evaporates very slowly.

Sphagnum moss is highly acid. Nevertheless, it is a good seeding medium for all types of plants, including those that normally grow in alkaline soils, such as cactuses and many succulent plants.



NEG. NO. 89592

FIGURE 2.—A sphagnum leaf magnified 200 times to show the arrangement of the water-holding cells.

Sphagnum moss contains most of the elements essential to plant growth, but only in relatively small quantities. Consequently, seedlings and rooted cuttings can be grown in the moss only temporarily without the application of a nutrient solution. Nutrients in the moss are sufficient to sustain seedlings prior to transplanting and it is not necessary to fertilize the seed flats.

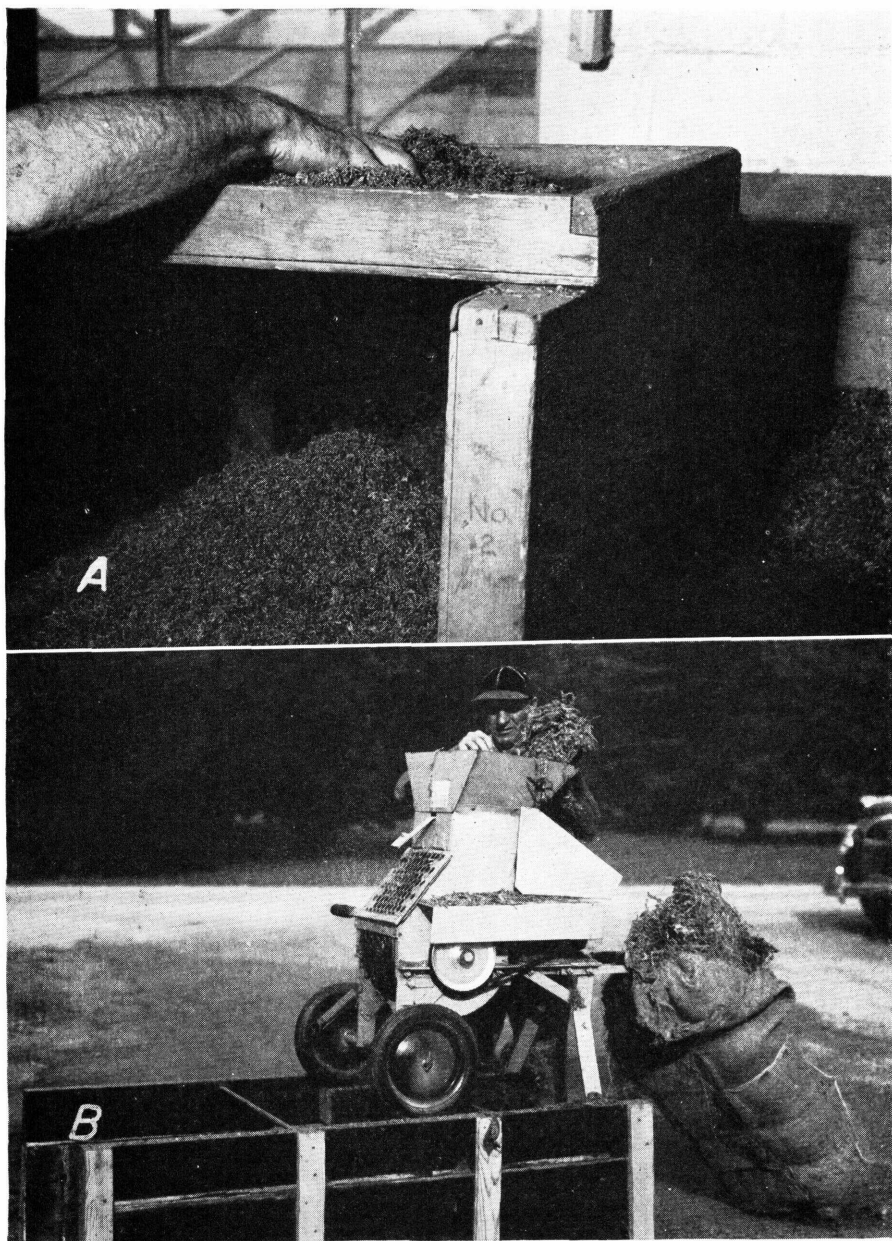
When plants are to be grown for several months or even years in moss, regular applications of a nutrient solution are required while the plants are actively growing. A suitable solution can be made by adding 1 teaspoonful of potassium nitrate and 1 teaspoonful of ammonium nitrate to a gallon of water or by adding 2 teaspoonfuls of a mixed fertilizer, such as 10-6-4, to a gallon of water. Any prepared liquid fertilizer may also be used according to direction.

## PREPARATION OF SPHAGNUM MOSS

For seed germination, as a rooting medium, or for potting plants, the stringy, crude sphagnum moss must be shredded. Hand shredding can be done by rubbing the sphagnum through a wire screen having three meshes to the inch. Figure 3 shows the hand preparation of sphagnum moss. Larger quantities can be ground through a small shredder, provided the grid size will not reduce the moss to a dust-like consistency. Figure 3 also shows the preparation of sphagnum with a soil shredder mounted on a box to prevent the shredded moss from being dispersed too widely.

## SEED GERMINATION

Sphagnum moss in the shredded condition is a highly desirable seedling medium. The moss can be used to fill the seed flat entirely, or an underlying, easily drained soil mix-



A. NEG. NO. 87606 B. NEG. NO. 89816

FIGURE 3.—A, Hand preparation of sphagnum moss for seed germination—rubbing it through a hardware-cloth screen; B, mechanical shredding of sphagnum, the shredded moss being collected in a box with open ends.

ture may be placed in the flat first and covered with three-fourths inch of the sphagnum. The moss is

placed in the flat and mounded above the rim. Then it is compressed to a smooth seedbed, ap-





A. NEG. NO. 89949 B. NEG. NO. 87839

FIGURE 4.—Preparation of a sphagnum moss seed flat: *A*, The moss is mounded above the rim and then compressed with a board until it is about one-half inch below the rim; *B*, completed sphagnum moss flat, with glass and wooden spacer frame in place. The seed flat is a galvanized metal pan, painted with asphalt.

proximately one-half inch below the rim of the flat. Figure 4, *A*, shows the mounded sphagnum being compressed into a flat. The moss is watered thoroughly and allowed to drain. Seeds are then sown, either broadcast or in indented rows. Fine seeds will fall into the crevices of the moss surface and need not be covered, but larger seeds should be lightly covered with more of the screened moss.

When several kinds of seeds are sown in the same flat, they can be separated easily by a thin layer of dry sand. After the seeds are all sown, the flat should be sprinkled—preferably with a fine mist. Then labels, with india-ink markings for permanency, are put in place. The flat is covered with a pane of glass or with a glass substitute. Figure 4, *B*, shows a completed sphagnum moss seed flat. Glass may be laid

directly on the rim of the flat or, as shown in the illustration, it may be raised on a light wooden frame. In place of the glass pane, a frame with a sheet of plastic film tacked to it may be used as a cover. Plastic with wire screen embedded in it will last longer. Like glass, a plastic covering reduces moisture loss. An advantage of the plastic film is that it gives the flat an even, subdued light. Also, the film has an advantage over glass in not being heavy and in not shattering.

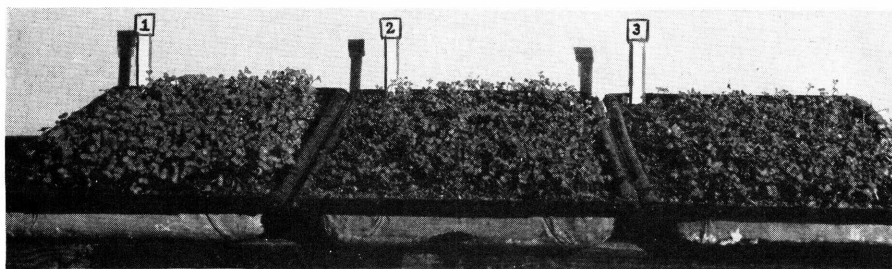
Seed flats prepared in the above manner and placed in a humid location require no further attention until after the seedlings germinate and are ready to be transplanted. However, when dry conditions exist or where seed flats remain for several months before germination commences, occasional watering may be necessary. Transplanting is performed when the seedlings have developed their first true leaves. When there is an excess of seedlings, the flat can be held as a form of "living storage." Although the seedlings will become stunted and unkempt, they will survive for as long as 4 or 5 years in this condition and at any time during the storage period develop normally when transplanted to soil.

Seeding in sphagnum moss is one way to overcome losses due to damping-off fungi. Diseases caused by these fungi rarely appear in sphagnum seed flats, and the use of

fungicides specifically designed for combating these organisms is not necessary. The moss does not require sterilizing prior to use, and it is also possible to use a sphagnum seed flat a second time without detrimental effects. After the seedlings have been transplanted, the surface may be broken up and a small quantity of fresh sphagnum added. The flat is then ready for further use. It has been observed that seed flats several months old are as suitable to use as those freshly prepared. Figure 5 shows the results when reused sphagnum flats were compared with freshly prepared flats. The increase in vigor of the plants in reused flats is probably due to an increased breakdown of the old moss.

Sphagnum moss may well be used for seeds that require stratification, which is essentially the growing of seed in a damp medium at low temperature. This treatment will allow the seeds to complete their ripening after being picked, so that germination can occur. Seeds of roses, hollies, and magnolias require this treatment before they will germinate. The flat is prepared in the usual manner, a thin layer of moss covering the seeds, and placed in a cold but above-freezing location, such as an unheated pit greenhouse or a deep, protected coldframe.

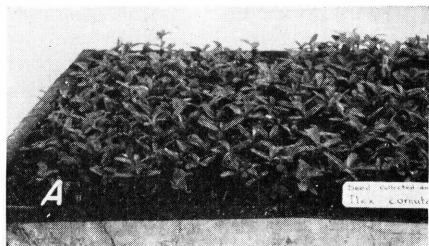
The flat must be protected against mice or other rodents. It will not be necessary, after an initial slight



NEG. NO. 89420

FIGURE 5.—Comparative germination and growth of cabbage seedlings on 6-month-old reused sphagnum (left); 1-month-old reused sphagnum (center); and fresh sphagnum (right).





A. NEG. NO. 89630 B. NEG. NO. 89510

FIGURE 6.—Germination of seed in sphagnum moss: A, Holly seedlings that have been stratified in the moss; B, rhododendron seedlings. Rhododendron seed should germinate in 14 to 30 days.

dampening, to water the flat during the stratification period. Because the seeds are sown on the surface, it will be possible to follow the course of the stratification treatment easily. Most seeds handled in this manner will have germinated the spring following the sowing of the seed. For example, seeds of magnolia sown in November will germinate and be ready to transplant the following May.

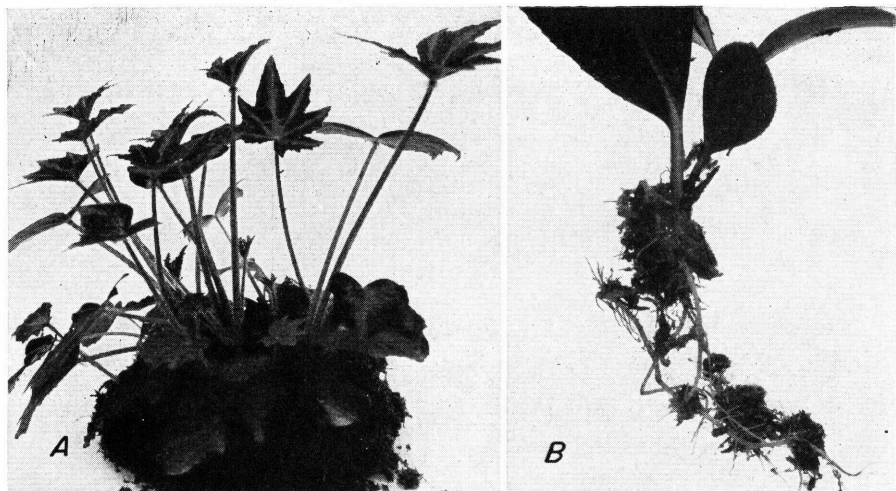
Sphagnum moss is desirable as a medium for fine seeds that have been considered difficult to germinate. Among the woody plants, rhododendrons are a good example of a plant with fine seeds. Perennials such as columbines, primroses, and pinks are also sometimes difficult to germinate. The texture of the sphagnum is such that the tiny seedlings are kept moist during the first stages of development without the frequent waterings that soil requires. Frequent waterings of soil often destroy the tiny seedlings. Fine seed is best handled by sowing

directly on the moss surface—not covering the seed—and by placing the flat in an unheated greenhouse in March where the seed will germinate and the plants develop slowly. Figure 6 shows examples of germination in sphagnum moss—of holly seed which requires stratification, and of the fine seed of rhododendron.

## ROOTING CUTTINGS IN SPHAGNUM MOSS

Sphagnum is used as a medium for rooting cuttings—those from stem, leaf, leafbud, or root. For this method of propagation, the shredded moss is best suited and it may be used alone or mixed with equal parts of sand. Many house plants, for example, African violets and some types of begonias, are propagated by leaf cuttings, either by placing the leaf flat on the rooting medium or by sticking the fleshy petiole into the medium. A similar method is often used to propagate cuttings of some woody shrubs, for example, camellias and rhododendrons, but with this method the bud of the leaf axil must be attached to the cutting. Because of the moisture-holding capacity of sphagnum moss, leaf cuttings placed flat on the surface of the moss are less inclined to decay than those propagated on sand where frequent watering is necessary. Figure 7 shows an example of a leaf and a leafbud on sphagnum moss.

Both softwood and hardwood stem cuttings may be rooted in sphagnum moss. A combination of sphagnum and sand results in a rooting medium that retains moisture readily. Softwood stem cuttings are planted in this combination as in other sand-rooting media. Hardwood stem cuttings may be collected in early winter, tied in bundles and buried in sphagnum moss until rooted, after which they may be potted and, in the greenhouse, continue their growth. Since



A. NEG. NO. 89515 B. NEG. NO. 89349

FIGURE 7.—A, Begonia leaf rooted in sphagnum moss, showing the new plants; B, camellia leafbud cutting rooted in sphagnum moss

stem-cutting propagation is carried on during the winter, a greenhouse or other heated propagating unit is essential.

Root cuttings are important as a means of propagating shrubs, including the leguminous ones such as common mimosa.<sup>2</sup> Crapemyrtle, daphne, clethra, and cyrilla are examples of nonleguminous plants that root from root pieces. These cuttings are produced in early winter by digging up a root from a plant and cutting it in pieces 3 to 4 inches long. These pieces are placed in sphagnum moss, either by scattering them over the surface of a moss flat and covering them with more moss or by standing them on end with the larger end (that nearest the trunk) uppermost. Such cutting flats can be put in a warm greenhouse or placed in a coldframe and rooting will begin at a time in the spring depending on the amount of heat the flats receive. The buried cuttings will give better rootings if not transplanted until the fall of the next year. Figure 8 shows the re-

sults obtained from propagating plants in sphagnum moss by means of root cuttings.

## AIR LAYERING

Air layering is a widely practiced method of rooting older branches of plants by wrapping them with a handful of sphagnum moss.<sup>3</sup> In greenhouses, it is only necessary to wound the branch, apply a small amount of a rooting compound, and bind the moist moss to the branch. The sphagnum will require an occasional watering, and rooting of most succulent-stemmed conservatory plants will occur in a matter of weeks.

The same method can be used outdoors on woody plants, provided the sphagnum is covered with a sheet of plastic film, such as polythene, to reduce moisture loss to a minimum. Because of the low rate of moisture transmission of such films, it is not necessary to remoisten the sphagnum moss once it has been applied. Generally, the method is

<sup>3</sup> Commercial peat is not suitable, since it does not adhere in a ball around the stem.

<sup>2</sup> The mimosa *Albizia julibrissin*.



A. NEG. NO. 89511 B. NEG. NO. 90187

FIGURE 8.—*A*, Root cuttings of leatherwood (Cyrilla) 3 months after they were placed in sphagnum moss; *B*, individual root cuttings of mimosa showing the development of new shoots and roots from the old root pieces.

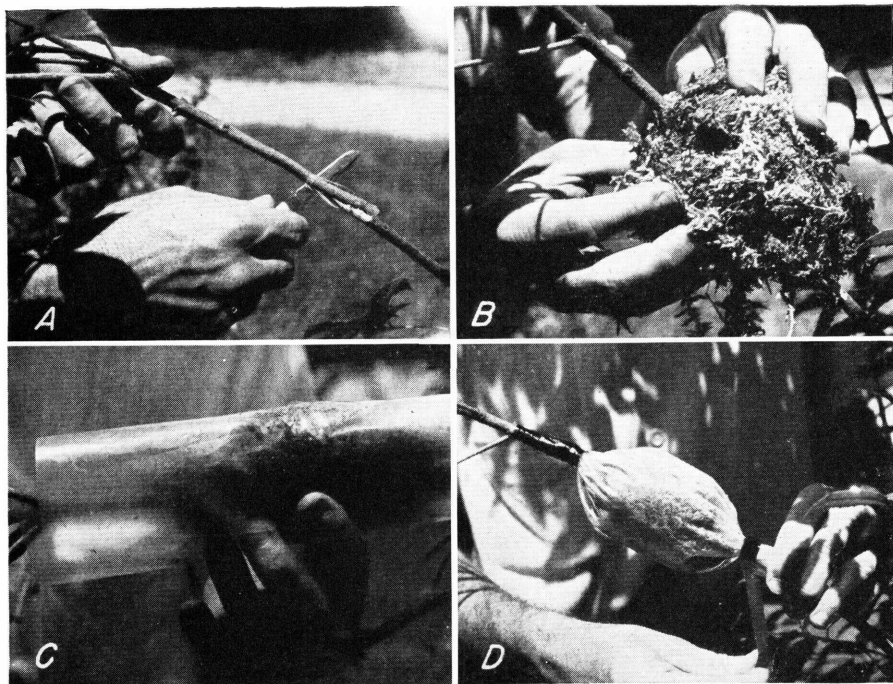


FIGURE 9.—Preparation of an air layer: *A*, Wounding the stem; *B*, applying the sphagnum; *C*, wrapping the sphagnum with an 8- by 10-inch plastic film; *D*, taping the plastic to make a tight sack.

best suited to plants that will ordinarily root from cuttings or from the mound layering of branches.

In preparing an air layer, the branch should be wounded, either by a slant cut or by girdling, preferably on wood formed the previous year. It is possible to use older branches for layering, but the degree of success will diminish with the age of the wood used. A small quantity of a rooting compound, such as is used for cuttings and sold in most garden stores, is dusted into the wound and the branch is then wrapped with a handful of damp sphagnum moss. The moss should be squeezed tightly to remove all excess water. An 8- by 10-inch sheet of plastic film is wrapped around the moss, overlapped to make a good seal, and tied at each end with electrician's plastic waterproof tape, rubber budding bands, or strips of the plastic

film itself, to make a tight sack around the moss. Figure 9 shows the steps in preparing an air layer.

Air layers may be applied in the spring or late summer. With some plants air-layered in the spring, rooting will take place by fall. With layers made late in the summer and with difficult plants layered in the spring, rooting will not occur until the next year, and some plants (such as magnolia) have required even longer to root. Allowing rooted layers to remain on the plant over winter does not appear to have any adverse effects.

When the layer has rooted, some roots may be seen through the film. In other instances, rooting can be determined only by opening the layer to find the fine roots emerging from the stem. When the layer has been cut from the plant directly below the sphagnum ball,



remove the film and place the layered plant in the soil without disturbing the moss. Rooted layers may be removed in late summer and on through the autumn, and should be planted in a cool, shaded place. Placing a plastic hood or bell jar over the new plant will help its establishment. If a cold-frame or unheated greenhouse is available, layers will continue to develop roots during part of the winter and will be well established for planting out the following spring.

### SPHAGNUM MOSS FOR GROWING AND SHIPPING PLANTS

Sphagnum moss should be used as a growing medium for all plants that are to be shipped long distances or where shipping weight is important, as in air transportation. Not only are plants grown in the moss light in weight but a root ball develops which will not break when dropped. Furthermore, clean sphagnum is an approved shipping material because of its aseptic properties.

Both seedlings and cuttings can be transplanted into shredded sphagnum and grown indefinitely with the fertilizer applications described earlier (see p. 2). When ready to be packed for shipping, the sphagnum ball is compressed firmly without removing any moss. Several plants are assembled together in a bundle, moss is added to cover roots on the outer part of the large ball that is formed and the plants are tightly wrapped in waterproof paper. These packaged plants can then be shipped in lightweight cardboard cartons. Figure 10 shows plants grown in sphagnum moss and



NEG. NO. 89504

FIGURE 10.—Holly plants grown in sphagnum moss compared to those grown in soil: A, Sphagnum-grown plant; B, soil-grown plant.

in soil. Photograph on cover shows details of packing.

In transplanting to the nursery it is necessary for the sphagnum to be covered so a complete contact is made between the root ball and the soil.

### SUMMARY

Sphagnum moss can be used as a soil substitute for various propagation techniques. It is ideal as a seed-germinating medium since it is sterile, light in weight, and holds considerable moisture. It can be used for propagating leaf, stem, or root cuttings. It is indispensable for air layering plants and is an important growing medium for plants that are to be shipped long distances or where weight is an important consideration. Plants grown in sphagnum moss require regular monthly applications of fertilizer during the growing season.